



Improving Forecast Guidance through the Joint Hurricane Testbed

Jason Sippel – NOAA/OAR/AOML Hurricane Research Division
Chris Landsea – NOAA/NWS/NCEP/National Hurricane Center

The JHT is funded by the US Weather Research Program in NOAA/
OAR's Office of Weather and Air Quality

Joint Hurricane Testbed (JHT)

- Bridges hurricane research & operations
- Began in 2001 under the USWRP
- **Our Mission:** successfully transfer new technology, research results & observational advances from research groups to operational centers
- Testing is done at the National Hurricane Center, Central Pacific Hurricane Center or at their institutions

JHT: By the numbers

- Number of projects supported: 95
 - 82 completed
 - 54 implemented into operations at NHC/EMC/other
 - 21 not accepted
 - 5 deferred
 - 2 unable to be implemented
 - 8 projects started 1 Sep. 2015 (FY15-17: 8th round, 1 complete)
 - 6 projects started 1 July. 2017 (FY17-19: 9th round)

Metrics for Operational Implementation

- **Forecast or Analysis Benefit:** expected improvement operational forecast and/or analysis accuracy
- **Efficiency:** adherence to forecaster time constraints and ease of user's needs
- **Compatibility:** IT compatibility with operational hardware, software, data, communication, etc.
- **Sustainability:** availability of resources to operate, upgrade, and/or provide support

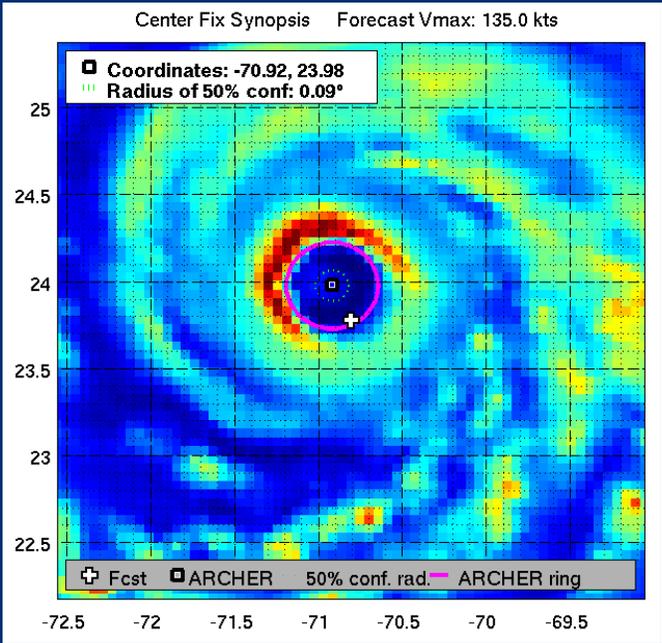
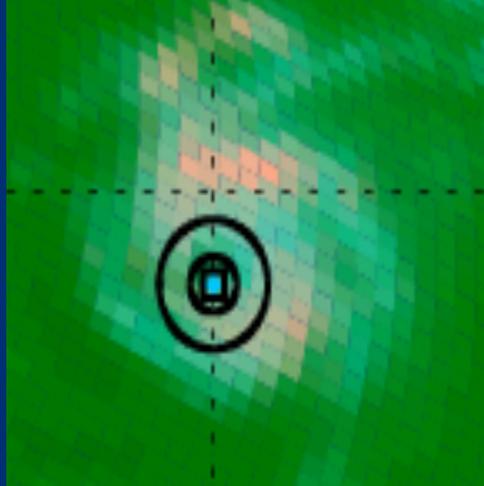
Our process

- Call for Proposals – drafted and disseminated (bi-annually)
- Principal Investigators apply for funding through NOAA
- Seven member Steering Committee rates all proposals
- Funded projects are tested during 1 or 2 hurricane seasons in conjunction with NHC points of contact
- At the project's end, each are evaluated by NHC and JHT staff
- Implementation of successful projects are then carried out by NHC staff/PIs

Current Project Highlights - FY15-17: 8th round

Tropical Cyclone Genesis Index: Dunjon

	* ATLANTIC TC GENESIS INDEX *												
	* AL972013 10/01/13 18 UTC *												
TIME (hr)	0	6	12	18	24	36	48	60	72	84	96	108	120
TCGI (%)							45.1						65.0
HDIV (x10 ⁻⁷ s ⁻¹)	-3.0	-4.0	-1.0	-3.0	-5.0	0.0	-6.0	1.0	-5.0	0.0	-4.0	0.0	0.0
VORT (x10 ⁻⁶ s ⁻¹)	1.3	1.6	1.6	1.7	1.6	1.5	1.1	0.8	1.0	0.5	1.1	1.1	1.1
DV24 (x10 ⁻⁶ s ⁻¹)	0.3	0.0	-0.1	-0.7	-0.5	-0.7	-0.1	-0.3	0.1	0.6	0.0	-0.1	-0.3
VSHD (kt)	5	9	11	9	9	17	19	19	19	26	24	28	27
MLRH (%)	67	67	64	63	67	64	68	62	64	52	54	52	54
PCCD (%)	42	N/A											
TNUM	1.00	N/A											
LAT (deg N)	16.8	17.2	17.8	18.5	20.3	22.9	25.0	26.3	27.6	28.3	29.2	30.1	31.4
LON (deg W)	83.0	83.5	84.4	85.1	85.8	87.0	87.4	87.5	86.8	86.5	85.5	84.4	82.9
DTL (km)	169	172	217	259	132	154	382	358	270	188	56	-5	-140
TRACK SOURCE	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO	AVNO



U.S. NAVAL RESEARCH LABORATORY

NRL Tropical Cyclone Page

Storm Home | Microwave | Scatterometry | Vis/IR | ATCF | Environment

Pass Mosaic | Mosaic | List | Instant Loop | Animated Gif

Storm List

Sensor	% Cov	89H	89 Diff	89 Color	37H	37 Diff	37 Color	19H	19 Diff	Vis	IR Color	IR Dvorak	RGB Test 1	RGB Test 2	RGB Test 3
F08 SSM/I	55.7	■													
F16 SSM/I	62.7	■													
AMS R3	99.9	■													
TMI	33.9	■													
WINDSAT	49.9	■													
MWI	66.0	■													

Currently: Saturday, August 13, 2016 18:44:14 UTC (Z)

Switch | Reverse | Rock | Next | Previous | Speedup | Slowdown | Refresh | Zoom In | Zoom Out

Speed bar for animations

GCOM-W1 AMSR2 89H 2016/07/25 22:11:00Z NRL-Monterey

Rapid Intensity Forecasting: Jiang

Eyewall Replacement Cycle
ARCHER: Wimmers

Matrix of RI probabilities

RI (kt / h)	20/12	25/24	30/24	35/24	40/24	45/36	55/48
SHIPS-RII:	17.4%	64.3%	54.0%	37.1%	30.9%	62.9%	78.6%
Logistic:	7.1%	42.6%	43.0%	19.6%	12.3%	55.7%	56.8%
Bayesian:	0.9%	47.6%	34.5%	8.3%	3.5%	10.1%	36.4%
Consensus:	8.5%	51.5%	43.9%	21.6%	15.6%	42.9%	54.6%

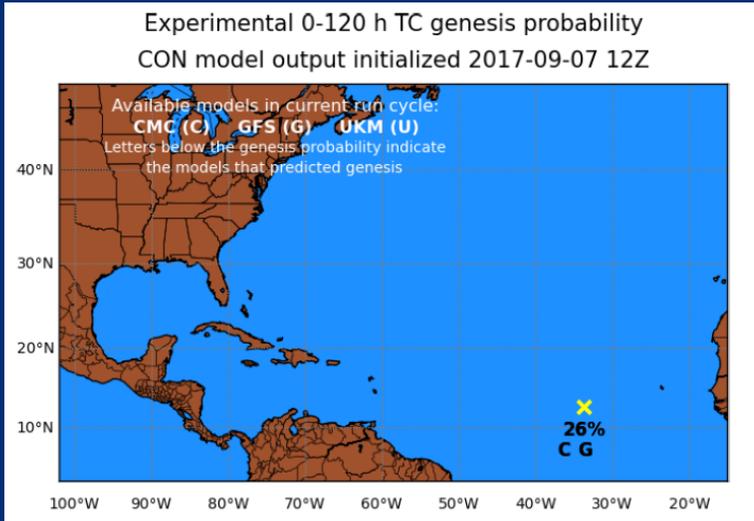
NRL web page upgrades: Cossuth

RI SHIPS improvement: Rozoff

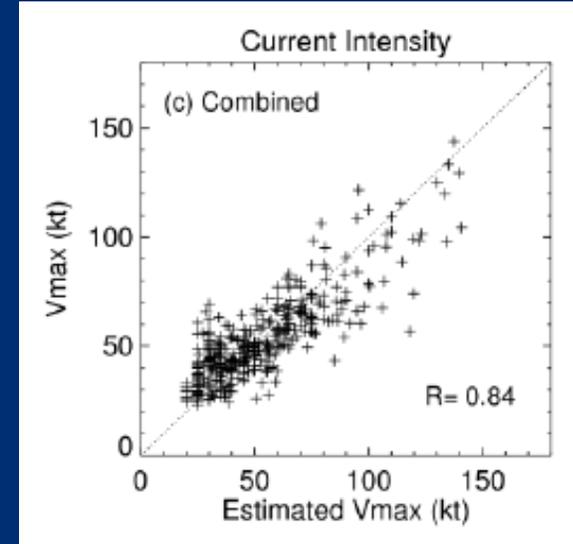
New JHT Projects - FY17-19: 9th round

Project Title	Principal Investigator(s)
Improvements to Operational Statistical Tropical Cyclone Intensity Forecast Models Using Wind Structure and Eye Predictors	Galina Chirokova (CSU/CIRA), John Kaplan (AOML/HRD)
Ensemble-based Pre-genesis Watches and Warnings for Atlantic and North Pacific Tropical Cyclones	Russ Elsberry (UC-CS)
Improvements and Extensions to an Existing Probabilistic TC Genesis Forecast Tool Using and Ensemble of Global Models	Bob Hart (FSU), Dan Halperin (Embry-Riddle)
Estimation of Tropical Cyclone Intensity Using Satellite Passive Microwave Observations	Haiyan Jiang (Florida Intl Univ.)
Transition of Machine-Learning Based Rapid Intensification Forecasts to Operations	Andrew Mercer and Kimberly Wood (MSU)
Evolutionary Programming for Probabilistic Tropical Cyclone Intensity Forecast	Paul Roebber and Clark Evans (UW-Milwaukee)

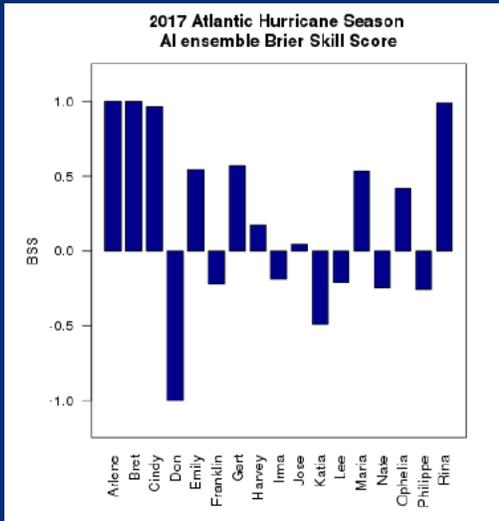
New JHT Project Highlights



TC Genesis probability:
Hart/Halperin

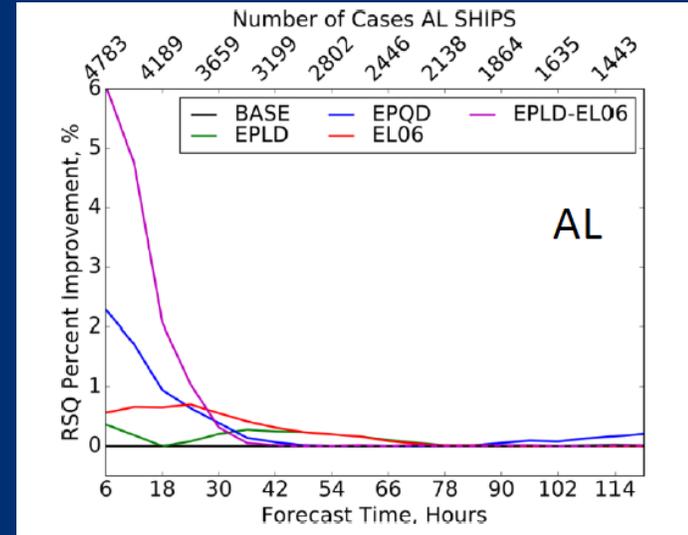


Estimating TC intensity with PMW obs: Zhang



Improving RI forecasts with machine learning:
Mercer

Improving intensity forecasts with size predictors:
Chirokova



The Joint Hurricane Testbed

The screenshot shows the website for the Joint Hurricane Testbed (JHT) at www.nhc.noaa.gov/jht. The page features a navigation menu with links for Home, News, Organization, and Search. A search bar is present with "NWS" and "All NOAA" buttons. The main content area includes a header with the USWRP logo and the text "Joint Hurricane Testbed". Below this is a "JHT Overview" section with links for Overview, Current Projects, Past Projects, Admin Presentations, Highlights, Staff, and Committee. The "Mission Statement" section states: "The mission of the Joint Hurricane Testbed is to transfer more rapidly technology, research results, and observational advances of the United Program (USWRP), its sponsoring agencies, the academic community improved tropical cyclone analysis and prediction at operational centers." The "News" section lists three items: "20 March 2012: 2012 IHC presentations posted for 2011-2013 projects", "1 November 2011: Press Release on new 2011 funded JHT projects", and "30 September 2011: New JHT projects (Round 6, FY11-13) announced". A "View News Archive" link is provided. The "Main Activities" section lists four bullet points: "Identify new techniques, models, observing systems, etc. with potential via an announcement of opportunity and a proposal, review, and funding", "Establish and maintain an infrastructure to facilitate the modification and integration of tools, techniques, and data into the operational computing, communication, and display environment", "Complete tests in a quasi-operational environment of tools, techniques, and data, with metrics for scientific performance, ease-of-use, and support", and "Prepare documentation, training, and performance evaluations of successful tools, techniques, and data to facilitate use and support in operations." A footer note says "Please see the Joint Hurricane Testbed Terms of Reference (PDF) for more details." The left sidebar contains various links for local forecasts, alternate formats, cyclone forecasts, marine forecasts, tools & data, development, outreach & education, resources, our organization, and contact us.

Rappaport et. al., 2012 - *BAMS*

THE JOINT HURRICANE TEST BED

Its First Decade of Tropical Cyclone
Research-To-Operations Activities Reviewed

BY EDWARD N. RAPPAPORT, JIANN-GWO JIING, CHRISTOPHER W. LANDSEA,
SHIRLEY T. MURILLO, AND JAMES L. FRANKLIN

Collaboration between researchers, forecasters and technology specialists facilitated the development and implementation of numerous projects benefitting forecast operations.



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